

Exercises Matrix

1.- Write a function that transposes a matrix without using the function `t(A)`.

$$A = \begin{pmatrix} 6 & 14 & 13 \\ 3 & 9 & 5 \\ 7 & 1 & 21 \\ 32 & 5 & 2 \end{pmatrix} \quad B = \begin{pmatrix} 6 & 3 & 7 & 32 \\ 14 & 9 & 1 & 21 \\ 13 & 5 & 21 & 2 \end{pmatrix}$$

Solution:

```
transpose<-function()
{
  A=matrix(c(6,14,13,3,9,5,7,1,21,32,5,2),ncol=3,nrow=4,byrow=TRUE)
  B=matrix(0,nrow=ncol(A),ncol=nrow(A))
  print(A)
  for (i in 1:nrow(A))
    for (j in 1:ncol(A))
      B[j,i]=A[i,j]
  print(B)
}
```

2.- Write a function that, given a square matrix, modifies the elements of its diagonal in the number of their position and insert the numbers that were in that diagonal into a vector.

$$A = \begin{pmatrix} 6 & 14 & 13 \\ 3 & 9 & 5 \\ 7 & 1 & 21 \end{pmatrix} \text{ Se crearía: } B = \begin{pmatrix} \mathbf{1} & 14 & 13 \\ 3 & \mathbf{2} & 5 \\ 7 & 1 & \mathbf{3} \end{pmatrix} \quad C = (6, 9, 21)$$

Solution:

```
diagonal<-function()
{
  A=matrix(c(6,14,13,3,9,5,7,1,21),3,3)
  B=matrix(0,ncol=ncol(A),nrow=nrow(A))
  C=c()
  for (i in 1:nrow(A))
    for (j in 1:ncol(A))
      if (i==j)
      {
        B[i,j]=i
        C=c(C,A[i,j])
      }
    else
      B[i,j] =A[i,j]

  print(A)
  print(B)
  print(C)
}
```

3.- Write a function that asks the user for data between 0 and 20, and check if that data exists in the matrix, if so write an *. The function will end when the whole matrix has *.

$$A = \begin{pmatrix} 6 & 14 & 13 \\ 3 & 9 & 5 \\ 7 & 1 & 20 \end{pmatrix}$$

Solution:

```
exercise3<-function()
{
  A=matrix(c(6,14,13,3,9,5,7,1,20),3,3, byrow=T)
  max=ncol(A)*nrow(A)
  cont=0
  while(cont<max)
  {
    print("Insert a number (0:20)")
    num=scan(,what=numeric(),1)
    print(num)
    while ((num < 0 ) | (num>20))
    {
      print("Out of range. Please, Insert a number (0:20)")
      num=scan(,what=numeric(),1)
    }
    for (i in 1:nrow(A))
    for(j in 1:ncol(A))
    if (A[i,j] ==num)
    {
      A[i,j] = "*"
      cont=cont+1
      print(cont)
      print(max)
    }
  }
  print(A)
}
```

4.- Write a function that asks the user for data between 0 and 20, and check if that data exists in the matrix, if so write an *. The user will be allowed 10 attempts. At the end, the number of correct guesses will be verified and shown on the screen.

$$A = \begin{pmatrix} 6 & 14 & 13 \\ 3 & 9 & 5 \\ 7 & 1 & 20 \end{pmatrix}$$

Solution:

```
exercise4<-function()
{
  A=matrix(c(6,14,13,3,9,5,7,1,20),3,3)
  print("You have 10 attempts")
  numCorrect=0
  attempts=0
  while (attempts <10)
  {
    print("Insert a number (0:20)")
    num=scan(,1)
    while((num <0 ) | (num>20))
    {
      print("Out of Range")
      num=scan(,1)
    }
    attempts= attempts +1
    for (i in 1:nrow(A))
      for(j in 1:ncol(A))
        if (A[i,j] ==num)
        {
          A[i,j] = "*"
          numCorrect = numCorrect +1
        }
    print(A)
    print(attempts)
  }
  print(A)
  print("Number of correct guesses: ")
  print(numCorrect)
}
```

5.- Write a function that asks the user for data between 0 and 20, and check if that data exists in the matrix, if so write an *. The number of attempts will be passed to the function by parameter. At the end, matrix and the number of correct guesses will be verified and displayed on the screen; In addition, this information will be stored (matrix and number of correct guesses) in a file called "new.txt"

$$A = \begin{pmatrix} 6 & 14 & 13 \\ 3 & 9 & 5 \\ 7 & 1 & 20 \end{pmatrix}$$

Solution:

```
exercise5<-function(times)
{
  A=matrix(c(6,14,13,3,9,5,7,1,20),3,3)
  cat("You have ", times, " attempts\n")
  numCorrect=0
  attempts=0
  while (attempts < times)
  {
    print("Insert a number (0:20)")
    num=scan(,,1)
    while((num <0 ) | (num>20))
    {
      print("Out of Range")
      num=scan(,,1)
    }
    attempts= attempts +1
    for (i in 1:nrow(A))
      for(j in 1:ncol(A))
        if (A[i,j] ==num)
        {
          A[i,j] = "*"
          numCorrect = numCorrect +1
        }
    print(A)
    print(attempts)
  }
  print(A)

  write.table(A, "C://MandT//nuevo.txt")
  dataFile=c("Number of correct guesses: ", numCorrect)
  write(dataFile,"C://MandT//nuevo.txt",append=TRUE)
}
```

```
>exercise5(4)
```